REMARKS

The Examiner has objected to claims 16-21, 24-26, and 28-30 for the reasons noted in the official office action. The Applicant believes the objected to informalities have now been adequately corrected. The following remarks address the Examiner's concerns regarding sufficient clarity of particular claimed elements relative to the noted objections.

In claim 16, the Examiner states that it is unclear how the speed of the measuring body is determined from an actual output of the speed sensor depending on an actual output of the distance sensor in an evaluation device. As noted in paragraph 034, "[i]n the evaluation device of the speed measuring system, the actual output signal of the speed sensor 4 is evaluated, according to the actual output signal of the distance sensor 5 and forms an actual speed of the measuring body as an output signal of the speed measuring system." Accordingly to more clearly comport with the specification description, the Applicant notes that claim 16 has been amended to more clearly recite ". . .the speed of the measuring body is determined from an actual output signal of the speed sensor evaluated according to an actual output signal of the distance sensor in an evaluation device of the speed measuring system to improve reaction sensitivity of the speed sensor."

The distance sensor is important in solving the problem as stated in paragraph 013 of the specification of ". . .determining a speed of a rotating measuring body, on one hand, with a high signal quality within a large measuring range and on the other, at least extensively insensitive to vertical oscillations of the measuring body during operation and torsion oscillations of the measuring body when parked." In other words, if the amplitude of the signal output from the speed sensor does not achieve the values for a predefined range based on a measured distance between the measuring body and the sensor, then the signal output of the speed sensor is essentially thrown out, i.e., becomes "zero".

As the Applicant explains in the last sentence of paragraph 35 of the originally filed specification, referring to Fig. 2 shown below, "[i]f the actual measured speed signal amplitude is greater than the upper release threshold S_o or smaller than the lower release threshold S_u, the speed sensor 4 delivers a reliable speed signal unequal to 'zero'".

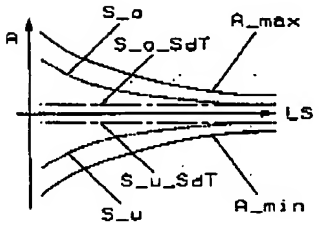


Fig. 2

Continuing in the first sentence of paragraph 36, the specification clearly explains how this is accomplished, "[t]he upper and lower release thresholds S_o, S_u are stored in the evaluation device (not shown) of the inventive measuring system in the form of characteristic lines specific to the sensor and/or specific to the measuring body as a function of the air gap LS." (Emphasis Added). Accordingly, the speed of the measuring body is determined by the actual output signal from the speed sensor evaluated in accordance with the actual output signal from the distance sensor. Output values not in a predetermined range according to release thresholds S_o and S_u as a function of the measured air gap LS, are essentially discarded leaving the specific speed sensor output signal values more accurately corresponding to the real environmental conditions represented by the measured distance between the measuring body and the speed sensor.

The actual calculations occurring in the evaluation device which determine the speed of the measuring body based on the evaluated output signal, as well as the actual input and storage of desired, element specific characteristic lines as a function of some variable (in this case distance LS) are performed in a manner highly familiar to anyone of skill in the art. The mathematical formulas and methods for calculating the speed of the measuring body and obtaining data for element specific characteristic lines are well known in the art and thus no further discussion is believed necessary.

In claim 20, the Examiner asserts that it is unclear what is meant by a distance measuring surface. The Applicant asserts that a "distance measuring surface" is precisely a surface from which distance is measured. As discussed in the Applicant's specification at paragraphs 030 and 031, "A measuring body, shown in simplified top view in Fig. 1, is designed

as toothed disc, for example, and axially has on its periphery, together with a customary counting toothing 2, a cylindrical smooth distance measuring surface 3" and in paragraph 031, "A stationary speed sensor 4 located radially to the toothed disc 1 in this embodiment conventionally detects, for example, inductive, magneto-resistive or via a Hall element, the pulse of the counter toothing 2 during a rotation of the measuring body." When read in context of claim 20, "the distance sensor scans, without contact, a contour of the measuring body as a distance measuring surface", it is clear from the language of the specification that the "distance measuring surface" is defined as the contour of the measuring body which the distance sensor scans.

In claims 24 and 25, the Examiner asserts that it is unclear what "specific characteristic lines" and "sensor-specific characteristic lines" are. Being that claim 25 is dependant on claim 24, the specific characteristic lines of claim 24 are the sensor-specific characteristic lines referenced in claim 25. Claim 24 has been amended to coincide with the language of claim 25. The specific characteristic lines claimed in both claims 24 and 25 are explained in paragraph 037 of the specification and shown in Fig. 2. Paragraph 037 states "[i]n another embodiment, the maximum and minimum speed signal amplitudes A_max, A_min can also be stored in the evaluation device of the speed measuring system in the form *of characteristic lines specific to the sensor as a function of the air gap LS* "

Turning now to the obviousness rejections, claims 16, 20, 21 and 28-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Wallrafen (6,181,127) in view of Andersen '442. The Applicant acknowledges and respectfully traverses the raised rejection.

As the Examiner is aware, in order to properly support a §103(a) for obviousness, the combined references must suggest, teach or disclose some motivation for one of ordinary skill in the art to combine the references as suggested by the Examiner. Wallrafen '127 teaches nothing more than a method and circuit for checking, i.e. determining, the air gap d between a coded rotor and a speed sensor element. The air gap d is determined based upon a measured speed signal. As noted in col 1, lines 29-33 "It is the object of the present invention to specify a method and a simple, cost-effective circuit for a magnetic speed sensor for

generating a discrete speed signal which contains information for the width of the air gap..." In other words the method and circuit of Wallrafen `127 does nothing more than determine the air gap d, and indicate an impermissably small or large air gap d relative to a prescribed tolerance band.

The manner in which this is accomplished by determining the change in the pulse duty factor at the output of the comparator circuit 6 is thoroughly described in the first two paragraphs of the Detailed Description of the Preferred Embodiment relating specifically to Fig. 1. However nothing more with regards to the indicative air gap d signal other than whether it deviates from a prescribed tolerance band is performed or accomplished in Wallrafen `127. The end result of Wallrafen's disclosure is that "[t]he change in the threshold value owing to the signal p from the amplitude discriminator 8 causes a change in the pulse duty factor at the output of the comparator circuit 6. In this way, an impermissibly small or large air gap width d may be indicated by a greatly changed pulse duty factor. The pulse duty factor therefore serves as information as to whether the air gap width d deviates upward or downward from prescribed tolerance band." Column 3, lines 48-55.

Anderson `442 is in some regards arguably similar to Wallrafen `127 in that it also merely determines the size of the air gap from a wheel speed monitoring system. As Anderson states at col. 2, lines 17-20. "[t]he speed signal is processed by means for integrating the speed signal and for producing an integrated signal that is inversely proportional to the air gap." Thus, Anderson also determines the air gap based on the speed signal from the wheel speed sensors. Furthermore, noting from the high pass filters 54, 58 shown in Fig. 3, of Anderson `442, this circuit produces an average air gap determination over time for indicating whether an undesirable change has occurred in the air gap. Anderson teaches, that where the air gap is no longer within a prescribed tolerance, it can be thus interpreted that some error is introduced into the measured wheel speed.

It is important to note the further description relative to Fig. 3 of Anderson `442 and the disclosure relative to the independence of the wheel speed sensor output and the determined air gap,

> Buffer 52 is provided between the coupling of air gap detector 20 and wheel speed sensor 22 and the antilocking brake system (ABS) electronic controller (not shown) to serve as a means for isolating air gap detector 20 from the ABS controller. Buffer 52 provides circuitry isolation such that air gap detector 20 does not interfere with the communications between the ABS controller and wheel speed sensor 22. Circuitry isolation is needed because the ABS controller typically continuously reads an output signal from sensor 22. Col 3 lines 48-59.

In other words, Anderson `442 does not want the determination of the air gap interfering with the wheel speed sensor or effecting the wheel speed output which is utilized by the ABS controller.

Both Anderson `442 andWallrafen `127 arguably teach specific methods and circuits for obtaining an air gap based on the sensed wheel speed. However, each of these references is complete in and of itself and provides no disclosure, teaching or suggestion that another circuit or method would provide better results. Furthermore if you could combine the two circuits and methods you would merely obtain the same result, i.e. some approximation of the air gap and perhaps whether the air gap is within a predetermined tolerance. Therefore there is no motivation which would cause one of skill in the art to combine these two references to achieve any improvement or different result, much less the Applicant's presently claimed invention.

Furthermore, while Wallrafen '127 discloses a method and circuit for checking the width of the air gap in a speed sensor, no distance sensor is disclosed in this reference. Wallrafen `127 discloses two speed sensors 3, 3' which generate a pulsating signal which can be used to determine whether the air gap is within an appropriate range. Wallrafen `127 explicitly discloses how the width of the air gap is determined (column 4, lines 16-24), whereby "the coded output signal Us with two different reference voltages U11 and U12. The output signals are fed to a microcomputer 21 which determines therefrom the speed n, direction sign (w) of rotation, and the air gap width diagnosis from the pulse duty factor." The pulse duty factor diagnosis which determines the air gap width is utilized when measurement signals are outside of a predetermined range as explained in the specification (column 3, lines 21-56;

also column 5, lines 6-13; Fig. 4). The pulse duty factor which is defined as ti/T as shown in Fig. 4, is derived from a series of step functions in which the output signal is plotted over time. The pulse duty factor is representative of the duration of one step of the output signal over a cyclical time interval. From the pulse duty factor, it may be determined if the air gap width lies outside a prescribed standard range.

Andersen '442 discloses a speed sensor including output signal proportional to air gap size. Andersen `442 discloses an electronic air gap detector which includes a high pass filter which removes any frequencies below approximately 5 Hertz. This electronic air gap detector is an entirely separate sensor which has a buffer to isolate the air gap detector signals from the wheel speed sensor signals. As noted in col. 3 lines 4-6 of Anderson `442, "Air gap detector 20 is useful for measuring an air gap change that is brought about by relative movement between axle 26 and bearing 28." What Anderson does not disclose, teach or suggest is the determination of an actual air gap distance.

As discussed above, while the two cited references may arguably pertain to a somewhat similar problem of measuring the rotational speed of a body, their respective approaches are completely different, Andersen discloses a separate distance sensor with its own electronic system protected by a high pass filter and buffering which is entirely different from the offset phase differentiation of two speed detectors. Thus, the references employ very different devices to achieve their results and therefore, it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Andersen with Wallrafen because they teach completely different approaches to solving a similar problem.

Even if the cited references could be combined, and the applicant adamantly contends they cannot, any possible combination of the references does not disclose all of the features of the Applicant's invention. The present invention does more than merely obtain a signal indicative of the air gap. The air gap signal is integrated with the speed measurement signal to obtain a real time reaction sensitivity to the actual operating conditions of the measuring body as noted in paragraph 019 of the Applicant's specification.

> According to the invention, said distance information is constantly used to adapt the release thresholds of the speed sensor that are specific to the sensor to the

> actual air gap between measuring body and speed sensor. Those values of the signal amplitudes of the speed sensor (for example, sinusoidally or rectangularly extending), the amount of which has to be exceeded in order that the speed sensor delivers a utilizable speed output signal unequal to "zero" are to be understood here as release thresholds. In principle, by integrating an actual air gap measure value, the reaction sensitivity of the speed sensor is constantly adapted to the real environmental conditions of the speed measurement.

Nowhere in either of the applied references, either alone or in combination is such an integration of the air gap signal with the wheel speed assessment to obtain a real time reaction sensitivity of the wheel speed output disclosed, taught or even suggested. Claim 16 specifically recites, "and the speed of the measuring body is determined from an actual output signal of the speed sensor evaluated according to an actual output signal of the distance sensor in an evaluation device of the speed measuring system to improve reaction sensitivity of the speed sensor." Although the references arguably determine an air gap, neither of Anderson `442, nor Wallrafen `127 disclose determining the real time speed based on an evaluation of the wheel speed signal in cooperation with the current distance sensor signal.

Turning to the Examiner's comments regarding the cited references, on page 6 of the official action, it is stated that Wallrafen `127 discloses 'a separate distance sensor (3') for determining an actual distance between the speed sensor and the measuring body. . .". The Examiner then states in the next paragraph that Wallrafen `127 ". . .does not explicitly disclose a separate distance sensor for determining an actual change in distance between the speed sensor and the measuring body." As best the Applicant understands this argument, the Examiner contends that Wallrafen `127 can be combined with the "separate distance sensor" in Andersen `442 in order to obviate all of the elements of claim 16. However, such a combination would replace the speed sensor (3') in Wallrafen `127 with the "separate distance sensor 20" in Andersen `442, it would be impossible to determine both the actual distance between the speed sensor and the measuring body and the change in actual distance between the speed sensor and the measuring body. Thus, all the limitations of claim 16 would not be obvious because the combined device would fail to disclose the actual distance and the change

in actual distance as recited in claim 16 "wherein the speed measuring system further comprises a distance sensor for determining an actual distance and an actual change in distance between the speed sensor [[(4)]] and the measuring body".

Furthermore, with regards to Wallrafen `127, the Examiner cites that sensor (3') is a separate distance sensor. Nowhere in Wallrafen `127 does it disclose that the sensor(s) measures distance in any manner. In fact, Wallrafen `127 discloses that both sensors (3) and (3') are arranged such that the outgoing measurement signals from each are phase shifted by approximately 90 degrees and the resulting measurement signals are converted into a rotational direction sign. (column 4, lines 4-9). The only distance measurement determined by Wallrafen `127 is that which is determined by the resulting pulse duty factor as explained above. The pulse duty factor is not a direct result of the signal from sensor (3'), rather an electronically generated ratio based on pulses created by the two speed sensors (3) and (3').

Thus in view of the above remarks and amended claims, the Applicant believes that claim 16 is now allowable. Because claims 17-30 are either directly or indirectly dependant on amended claim 16, these claims are now believed to be allowable as well.

The Applicant has added new independent claims 31 and 32 to this Application. New claim 31 has been added to include alternative language relating to the integration of the air gap signal with the measuring body speed sensor which as discussed above is believed to clearly differentiate the presently claimed invention from the applied references. Claim 32 includes the subject matter of previous claims 16,18 which is believed allowable in view of the Examiner's remarks regarding claim 18 in the official action, and the Applicant's above noted amendments to the same. Claim 33 includes the subject matter of previous claim 17 and new claims 34 and 35 contain the same subject matter of claims 19 and 24 and are dependent upon new claim 33 and thus these claims are believed allowable as well.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above amendments and remarks, t is respectfully submitted that the raised obviousness rejections should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability of the Wallrafen (W1 & W2) '127, '662, Andersen '442, Turner '563, and/or Teramae '308 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

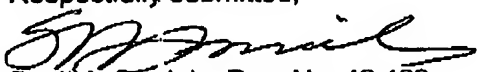
If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,



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